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**METHODS OF FORMING ALPHA AND BETA TANTALUM FILMS  
WITH CONTROLLED AND NEW MICROSTRUCTURES**

**ABSTRACT OF THE INVENTION**

Thin tantalum films having novel microstructures are provided.

The films have microstructures such as nanocrystalline, single crystal and  
10 amorphous. These films provide excellent diffusion barrier properties and are useful in microelectronic devices. Methods of forming the films using pulsed laser deposition (PLD) and molecular beam epitaxy (MBE) deposition methods are also provided, as are microelectronic devices incorporating these films.